

## Email Message

**From:** Hendley Paul USGR  
**Sent:** Monday, September 09, 2002 7:28 AM  
**To:** Egli Hans CHBS; Ressler Herbert DMT; Kiefer Enrico CHBS; dHondt Christian CHBS  
**Subject:** RE: More to the groundwater debate

Hans - an excellent and thorough response - thanks - I look forward to a meeting to discuss this thorny topic.

-----Original Message-----

**From:** Egli Hans CHBS  
**Sent:** Friday, September 06, 2002 5:27 AM  
**To:** Hendley Paul USGR; Ressler Herbert DMT; Kiefer Enrico CHBS; dHondt Christian CHBS  
**Subject:** More to the groundwater debate

Dear all

Having received copies of the e-mails exchanged between Herbert, Paul and Nick Jarvis, I would also like to make some contributions to that debate.

Last week I was at a meeting between Syngenta and Belgaqua (the Belgium Water Works Association) as a member of the Syngenta delegation to discuss the problems concerning pesticide residues in surface and groundwater the Belgium water works are faced with. I had prepared a slide series containing my experiences and conclusions with water monitoring studies. At a Syngenta pre-meeting we realized that my conclusions were very much atrazine-oriented and would need to be translated into a "Syngenta position" (although it is clear that the atrazine story can tell as a lot of generally valid things). I enclose the raw form of the slides (which we modified in some aspects before presenting) as they address some aspects of the pesticides/groundwater issue. The on-going e-mail debate between Paul and Herbert now confirms this need for a "Syngenta position". We should sit together, share our views and thoroughly analyze what is on the table with the aim of developing a generally acceptable position. I share very much Paul's opinion expressed in his e-mail sent 5th September with regard to the purpose of such a "position", that should be considered whenever it comes to the preparation of assessments, statements, proposals etc. with regard to groundwater issues, of course after an appropriate adaptation to the specific question.

**Therefore I would like to formally propose such a meeting. As the matter is very much business-relevant (even more so in future, I believe), participants should also come from global regulatory affairs, possibly product management, maybe others.** I'll try to come up with concrete proposals soon.

For such a meeting to be successful it is important in my view that participants know the starting points, experiences, opinions etc of all involved. This is why I would like to make some quite detailed comments on various items that were raised in the e-mail exchange between Herbert, Paul, and Nick Jarvis.

Let me start with a remark to Herbert's e-mail to the PFMODELS group where he comments about Syngenta Germany's proof that all terbutylazine detections in Germany are linked to non-use-related factors (false analyses, poor quality of wells). I consider the underlying study to be perfect, the causes for all contaminations were clarified and could be shown not to be use-related, the outcome of the exercise was thus very favorable. However, Herbert's statement about the findings can be understood as claiming that firstly terbutylazine is *per se* a safe product, and secondly a closer look at data would in most cases show that inadequate conduct of studies, misinterpretation of data, false results, inappropriate product handling of etc are the causes of detections of residues in groundwater, rather than normal product use. We should avoid all statements that can be understood in this way, because such conclusion would not only be wrong but also very adverse to a good climate between our company and regulatory and water authorities. It's not "terbutylazine" that is safe (no blanket statement!), it is the "use of terbutylazine under German use conditions" that turned out to be safe. The statement can certainly be extrapolated to other situations but it must not be generalized. And this conclusion does not free us from carefully interpreting other detections with other compounds or under other conditions, - the outcome of such interpretation has not always been and will not always be so favorable as in the case of terbutylazine in Germany.

In view of the importance of the subject I would like to make some more detailed comments to some of the many aspects that were touched in the cascade of the mentioned e-mails.

### Groundwater / Surface water

The very often cited Nidda-study in Germany, the new study by Jenny Kreuger, the Nil study (ongoing in Belgium by Pussemier) have suggested that residues in surface water are to a large extent due to direct input due to

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inappropriate handling. In Switzerland, we have observed the same way of contamination in at least two studies, however, the extent was much lower, input via drainage was higher than runoff from sealed surfaces. I don't know whether drainage input is also covered by the Nidda and the Kreuger study, I know for sure that it is not by the Nil study (no drainage systems in that region). So, at least depending on the local situation, drainage may considerably contribute to the residues in surface waters. Identification of farmer's product handling as a main pathway for contamination in some regions does not mean this pathway is the most important everywhere. Reality is highly variable.

Moreover, if inadequate product handling causes residues in surface water does not mean that the same is true for groundwater. These water bodies are different and the cited surface water studies cannot be used in the context of groundwater.

#### Quality of analytical data

This is a dark field also according to my experience. Before we enter a cooperation with an analytical laboratory we always check its performance, with sometimes very poor results. Even taking the hurdle of test analyses is no guarantee for continuous delivery of good results.

We have to bear in mind that residue analytical results are unavoidably imprecise; standard deviations of +/-30 percent are normal. The real problem are the "gross errors" i.e. the completely false results. However, the existence of false results does not justify to question all results. But it allows us to ask for quality checks. And we should do our best that appropriate data quality assurance programs become a must for all monitoring studies.

#### Interpretation of monitoring data

Results of a monitoring study must be interpreted and the cause for the residues must be investigated. In the German terbuthylazine study residues could be traced to non-use-related factors, hence no specific use recommendations must be given (except better education of farmers or closing down of some wells). One of the main reason was seen in "poor wells", i.e. point source contaminations by spraying close to wells. We have observed similar contamination pathways in some wells in studies in Switzerland, Greece, and Portugal. They are relatively easily detectable as they are characterized by their erratic occurrence and transient nature, moreover by their low portion of metabolites (if co-analyzed). However, I'm not convinced that we should call such wells "poor", a well is always a link between the surface and an aquifer, hence a certain risk for contamination if no care is taken. What is "poor", is the practice of overspraying wells (or filling of spray tanks directly at the wells as we observed in Greece). Wells should be protected by untreated zones!

Like Herbert I share the view of Nick Jarvis *"My conclusion with regard to regulation is that we need to treat monitoring data with caution, realizing that only a certain fraction is coming from the 'normal' agricultural use that we regulate on"*. But we must take the statement as it is; it says that a certain fraction of detects does come from normal use! This is in-line with our experience; we have seen more cases of diffuse contamination (from normal use) than point source contaminations! In such cases, the local hydrogeological or agricultural or whatever reasons for the residues should be identified. The conclusions should then find (and already have found) their way into the use recommendations. "Site-specific" use recommendations, that's what we have been calling for in the atrazine case since long.

#### Influence of compound properties (good product / bad products)

A statement in Jarvis' e-mail irritates me very much: "whether a single substance moves to groundwater or not (like Sygenta's compound that you mentioned which did not) is still most importantly determined by that compound's properties". This is less than half of the truth. I understand this statement as saying that terbuthylazine (=Sygenta's product) does not move to groundwater, whereas others do, presumably he classifies atrazine as such because this compound has become "the leacher" per se in the eyes of many. One additional methyl group in a side chain (that's the difference between these atrazine and terbuthylazine!) cannot make this black-white difference. It has been the (agreed!) Novartis position (and my personal conviction) that the use of a compound determines as least as much as its properties to which extent the compound moves to groundwater.

Product properties do play a role; for example it is true that compounds with GUS-values of below ca. 1-1.5 hardly ever leach; but all other compounds have a inherent risk to be transported into the groundwater, the extent (concentration) depending on product properties, the use conditions, on pedological and hydrogeological site characteristics and on climate. Many of these environmental parameters are more or less well known and allow the identification of vulnerable situations - vulnerable for most pesticides. For example, uses of herbicides to railway - all but one product used to railways leached!, or the "atrazine case" - former use conditions (up to 20 kg/ha, IWC, fall application) resulted in considerable detections of residues in groundwater, whereas safe uses could be demonstrated with the new use recommendations (up to 1 kg/ha, use only to maize/sorghum in spring, pending in our EU-submission).

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For terbutylazine, safe use in maize/ Germany has been demonstrated and proved in an impressive manner. This assessment is valid for this type of use under German (and similar) environmental conditions; it does not, however, classify terbutylazine as general "non-leacher". Its use to olives in Andalucia is, for example, not safe with respect to groundwater (residues >0.1 micro-g/L). So, no generalizations, please. Product properties are nothing more but one element needed to assess the leaching behavior.

#### Significance of preferential flow

It appears that we are all of the opinion that this type of transport exists. I'm currently working on a general paper about transport via pref. flow with Werner Koedel and Michael Klein (both Fraunhofer Institute Schmallenberg) that will appear under the umbrella of IUPAC. I have screened and evaluated the published research papers about this subject. The main study types to investigate this type of transport in a practically relevant manner are lysimeters *with structured soils* and field drainage studies. The transport via pref. flow is considerable (can exceed 1% of the applied material) and is slightly depending on the GUS value of a compound. It's relevance is clear for surface water and that type of aquifer where soil water can more or less freely percolate (preferential flow reaching groundwater directly, in case of Karst or other gravel beneath a relatively thin soil layer, e.g. 1-3 m).

In other cases, where percolation is not free, the amounts transported are much lower, presumably by a factor of at least 100 compared to the drainage/lysimeter studies. However, it is my firm belief that preferential flow plays a major role also many, possibly in most cases of diffuse input into the vadose zone and groundwater. The input is not direct, but I assume the penetration starts with preferential flow through the first meter or so of soil occurring by the first rains after application. Once residues are down in the subsoil they can migrate further in a slow process which is in most cases governed by chromatography type of flow. I have collected a considerable number of pieces of evidence that support this view, mainly from our own field studies.

It may appear that such discussions are of more academic nature. This is not the case. If it comes to site-specific risk assessment and tailoring of mitigation measures, it is important to know the mechanisms that may lead to a penetration into the groundwater as I mentioned above.

#### Infuriated regulators and political environment

The regulatory environment with respect to groundwater is different in USA and Europe. Whether we like or not, there is a clear and re-confirmed political will in Europe that pesticides must not be present in groundwater, which was translated into the 0.1 micro-g/L limit as a surrogate for zero. So it's clear that we have to demonstrate safe use with respect to groundwater and submit some kind of a positive statement which says that the risk for groundwater contamination is very low. But I think we have to look for a wording that is not too absolute and would not "infuriate" EPA regulators. On the other hand US assessments can also cause problems in Europe (and already did so, for example with metalaxyl) if residues found in US groundwater are qualified acceptable because being below tox-based levels (what is correct in USA but can be taken as proven risk for exceedence of the EU-limit). In this case, we should try and find a wording which relates detections exceeding 0.1 micro-g/L to US-specific circumstances.

Feeling uncomfortable with the registration climate and the attitude of relevant authorities, or their reaction upon our opinion, is certainly not very pleasant and does not make our life easy. However, it is a reality we have to cope with. It usually corresponds to the political will of a country which we have to respect. It is our duty to make the best out of it.

This is all for the moment. I can substantiate and illustrate all of my statements and claims by examples and would like to do so at the "groundwater meeting".

Best regards  
Hans

PS. This debate gave me access to PFMODELS of which I was not aware before!

Conclusions from Water Monitorings.ppt

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